WHAT IS CLAIMED IS:

1. A data reproduction device for sampling an analog signal reproduced from a recording medium based on a synchronization clock signal synchronized with the reproduced signal, the data reproduction device comprising:

an analog-to-digital (A/D) conversion part that converts the reproduced signal into a first digital signal based on a first clock signal;

an interpolation part that interpolates the first digital signal so that the first digital signal is equalized with a second digital signal sampled based on a second clock signal having a frequency *n* times a frequency of the first clock signal, the interpolation part providing an output based on the interpolation;

an optimum phase detection part that is supplied with the output of said interpolation part and, based on the output, detects a phase error between an optimum point of the reproduced signal and the synchronization clock signal;

a phase correction part that corrects a phase of the reproduced signal based on the phase error; and

an information data start detection part that detects a start of information data based on the phase error.

2. The data reproduction device as claimed in claim 1, wherein the recording medium has

recording tracks each having a phase detection region and an information data start detection region to which regions a predetermined pattern is written, and

wherein the optimum phase detection part of the data reproduction device detects a phase error between an optimum point of the predetermined pattern and the synchronization clock signal.

3. The data reproduction device as claimed in claim 2, wherein a predetermined dedicated pattern is recorded in the phase detection region and the information data start detection region.

4. The data reproduction device as claimed in claim 2, wherein the phase detection region and the information data start detection region comprise a single region.

5. The data reproduction device as claimed in claim 2, wherein the predetermined pattern differs between adjacent recording tracks.

6. The data reproduction device as

claimed in claim 1, wherein said interpolation part is an interpolation digital filter having coefficients substantially equal to an impulse response of a transmission characteristic of a signal recording and reproduction channel for the recording medium.

7. The data reproduction device as claimed in claim 1, wherein said interpolation part comprises a plurality of FIR filters arranged in parallel, the FIR filters each having a different set of coefficients.

8. The data reproduction device as claimed in claim 1, wherein said interpolation part interpolates the digital signal by linear interpolation that linearly divides the digital signal by *n*.

9. The data reproduction device as claimed in claim 1, wherein the recording medium has recording tracks each having a phase detection region and an information data start detection region to which regions a predetermined pattern is written, and wherein:

said A/D conversion part converts the reproduced predetermined analog pattern into a first digital pattern based on the first clock signal;

said interpolation part interpolates the first digital pattern so that the first digital pattern is equalized with a second digital pattern sampled based on the second clock signal having the frequency *n* times the frequency of the first clock signal; and

said optimum phase detection part detects the optimum phase by performing a cross-correlation operation between the interpolated digital pattern and data obtained by weighting the predetermined pattern, which is to be written to the phase detection region and the information data start detection region of the recording medium, with coefficients substantially equal to an impulse response of a transmission characteristic of a signal recording and reproduction channel for the recording medium.

10. The data reproduction device as claimed in claim 9, wherein said optimum phase detection part comprises a cross-correlation part that performs the cross-correlation operation in parallel.

11. The data reproduction device as claimed in claim 9, wherein said optimum phase detection part comprises an optimum phase comparison and selection part,

the optimum phase comparison and selection part comprising:

a storage part storing a maximum

cross-correlation value, an optimum interpolation signal number, and an optimum phase position; and

a comparison part that compares a new cross-correlation value obtained by the cross-correlation operation with the maximum cross-correlation value, and replaces the maximum cross-correlation value, the optimum interpolation signal number, and the optimum phase position stored in said storage part with the new cross-correlation value, and a new optimum interpolation signal number and a new optimum phase position corresponding to the new cross-correlation value, respectively, if the new cross-correlation value is larger than the maximum cross-correlation value.

12. The data reproduction device as claimed in claim 11, wherein said optimum phase comparison and selection part operates in accordance with a comparison gate.

13. The data reproduction device as claimed in claim 12, wherein the comparison gate is open for a period greater than or equal to a time length corresponding to the phase detection region and the information data start detection region, and is settable freely.

14. The data reproduction device as

claimed in claim 12, wherein said storage part is set to predetermined initial values when the comparison gate opens, is allowed to update the maximum cross-correlation value, the optimum interpolation signal number, and the optimum phase position while the comparison gate is open, and retains the maximum cross-correlation value, the optimum interpolation signal number, and the optimum phase position while the comparison gate is closed.

15. The data reproduction device as claimed in claim 11, wherein:

said phase correction part comprises a selector that corrects the phase of the reproduced signal by selecting an interpolation signal interpolated by said interpolation part in accordance with the stored or new optimum interpolation signal number output from said optimum phase detection part; and

said information data start detection part comprises:

an optimum phase output counter that detects the start of the information data out of the selected interpolation signal based on the stored or new optimum phase position output from said optimum phase detection part; and

a signal selection part that re-samples the selected interpolation signal into a signal synchronized with the synchronization clock signal.

16. The data reproduction device as claimed in claim 15, wherein:

said optimum phase output counter outputs only portion of the selected interpolation signal which part corresponds to the information data; and

said signal selection part re-samples the output portion of the selected interpolation signal so that the re-sampled output portion synchronizes with the synchronization clock signal.

17. A data reproduction apparatus, comprising:

a data reproduction device as set forth in claim 1;

an optical head that emits light to the recording medium and converts light reflected therefrom into an electrical signal;

an AGC and equalizer part that is supplied with the electrical signal output from said optical head and outputs the analog signal to said data reproduction device; and

a demodulator that demodulates an output of said data reproduction device.